

Low Power, Crummy Antenna

Ingenuity compensated for a limited budget in the Golden Age of Radio— and it'll do the same today. The tools and techniques to make radio magic are everywhere. If your wallet is a bit thin, it's time to indulge your creativity!

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An LPCA shack: basic, cheap, effective. Note the antenna mast on the deck, behind the tuners.

Unless you've been locked in a closet for the past 20 years, you know Amateur Radio is facing some daunting challenges. As we squeeze into smaller homes and make do with less "unallocated" cash, many hams are being pressured to be more creative than ever before.

Having been crushed in the money vise all my life, I had to solve these problems before I could even get on the air. Want to know how? Then lend an ear to KB7PWJ's Travelin' LPCA Medicine Show!

Jeepers, Creepers, Where'd Ya Get That...LPCA?

LPCA (Low Power, Crummy Antenna, not Log-Periodic Cubical Array or anything that exotic) is merely a new name for an idea as old as radio itself. In the beginning, virtually all hams operated LPCA. Just a handful of parts (auto parts, in the early years) could get an operator on the air. Hundreds succumbed. Limited range notwithstanding, the bottleneck-and-baling-wire station proved so irresistible that licensing had to be introduced to keep order on the airwaves.

Subsequent technologies have all but erased the spirit of those heady days. We catch a faint harmonic of it in modern QRP operations (especially the home-brew variety), but amateurs in general take a dim view of seat-of-the-pants operations. When I earned my call sign six years ago, I found little support for cost-effective HF. I waited three long years for my first contact, because I had neither the money nor the experience to put together a modern HF station.

I needed something suited to my limited budget and technical savvy, so I dug up old manuals from Amateur Radio's formative years, when poverty and ignorance were taken for granted. I talked with old-timers, whose first rigs were pieces of Model T Fords. I applied their bootstrap attitude to my problems and cobbled together a latter-day LPCA shack. And I've been having a blast ever

since.



This 18-inch Bilal antenna works the world with a 100-W signal.

Basic LPCA, circa 2000 AD

Okay, first you yank the ignition coil out of a car...(just kidding). Too bad, really. Spark-gap technology was accessible to everyone and, lest we forget, really cool. But it fell before the same pressure our hobby feels today. Coil-and-spark signals hogged entire bands. Amateurs began to chafe against commercial services and each other. So they started inventing. Their innovations steadily improved range, RF shielding and signal bandwidth, right up to the present day. Even the relatively sophisticated tube rigs of the postwar era lack shielding for today's close-quarters operations.

So, modern LPCA equipment has to be solid state. Ka-ching! Big bucks, right? Not necessarily. I bought my well-used Ten-Tec 580 Delta from a dealer for \$450, including new power supply and warranty. Hamfests, trade nets, the internet and friends offer even better deals. Important transceiver features include offset tuning (or RIT), built-in receiver filters and adjustable power outputs. Digital tuning and all-band coverage are helpful, but not essential. Antenna tuners, artificial grounds, low-pass filters and keys can be bought used or home-brewed.

In exchange for frugality, you enjoy relatively straightforward operation and simplicity, which lends itself to modification and repair. And there's less to go wrong in the first place.

You may have noticed a CW key among the accessories listed above. At the risk of touching off a riot, I believe that CW is the best choice for low-power, close-quarters work. Watt-for-watt, CW communicates farther than voice and creates fewer RFI problems. When you're tweaking a crummy antenna, you need all the help you can get. I know code is an emotional issue these days. I once got called a "senile old loon" for defending it in an internet discussion (I was 34 at the time). Still, for LPCA, brass is best.



A bottleneck antenna insulator.

First-Class Crummy Antennas

To properly operate LPCA, your antenna must be crummy. ("Crummy" isn't a performance judgment. In the context of this article it simply means doing your best in a lousy location with little money. Come to think of it, that's the definition of LPCA, too.) The secret to building a really fine crummy antenna is stinginess, impatience, and fear that the neighbors will find out. *QST* frequently runs plans for clever, low-cost crummy antennas, and there are some excellent crummy antennas available commercially.

Wire antennas were the rule in the old days. In my apartment days I built a 30-meter dipole and folded it around the balcony so the ends nearly met. These days I have a longwire. Or rather, a short-and-low wire. On 20, 30 and 40 meters—optimum LPCA bands—I can tune 1:1 SWR through 100 W without TVI.

Antenna hardware was amazing in times past. A budget-bound ham might wrap a gasoline-soaked string around the neck of a bottle, burn it off, and quickly place the bottle in cold water. Snap! An insulator popped off. Today's plastic soda bottles are even easier: Simply saw off the mouth and leave the petrochemicals where they belong! And they're free for the taking in campgrounds and parks, popular places for portable operations.

Keeping wire feed lines away from walls, gutters and each other, without mortgaging the farm for ladder-line and standoffs, requires more chutzpah. Grab a plastic fork—a clean one, if possible—and apply a gentle heat source, such as a candle flame, midway along the handle. When the plastic softens, bend the fork into an "L" shape and hold it away from the heat to firm up again. The handle's end is then affixed to a flat surface. The upright tines beg for wire to be wedged between them. I oblige. "Houston, we have a standoff."

To space a dipole's twin feeds I tie two forks together so their tines point in opposite directions. Plastic wire spools are even better. Holes at both ends of the drum allow you to pass wire through. Electrical tape prevents sliding, and the wide, flat rims act as standoffs as well.

Longwires (and random wires) are handy because they incorporate an antenna and feed line in a single, continuous wire. But how do you tie it off so you can run a slack end to your tuner without winding the wire around something, which is a no-no? I'm glad you asked. Screw a block of wood to something solid, like a wall or windowsill. Pull the wire across the block, place another block on top and screw it down hard. The wire is now clamped in place. The long leg can be stretched taut, leaving a free end for the binding post on your tuner.

In the apartment I used second-hand, coax-fed 20- and 40-meter Bilal Isotron antennas. I mounted them on the balcony before operating and took them down when I was done. They worked great and, although the mast was six feet from my TV, I could tune a clean signal at 100 W output.

Because crummy antennas seldom cooperate with your rig, an antenna tuner with a built-in SWR meter is mandatory. My apartment was far from ground in every sense, which created a host of interference woes. Judging from the wild advice I got before I tried the artificial ground, many hams don't know how effective this modest device is. I simply hooked it up, threw a counterpoise wire on the floor, twisted a few knobs, and station KB7PWJ was alive and happening.



A wooden-block longwire clamp.

A Rolling Stone Gathers no RFI

Sadly, draconian antenna restrictions and RFI headaches make even low-profile HF impossible in many places today. I sincerely hope amateurs will dedicate themselves to solving this dilemma, or our hobby may simply vanish. As it is, the only way some of us can enjoy hassle-free operation is to leave home. Once again, early hams were on top of the situation.

Nomadic operations have been an amateur specialty since day one. The "portable" station of yesteryear was a heavy tube rig mounted in a steamer trunk. Perhaps "luggable" is a better term. With vents opened and power and antenna connected, the operator was ready to mash the key.

Today we have micro-mobile sets that practically fit in your wallet—especially after you buy one. For cheaper fun, crate your rig and pretend it's 1944. Solid-state equipment packs up much more readily than the boat-anchor receivers and transmitters of old. Granted, it's a bit more awkward than the latest mobile rigs, but the field station goes from house, to hilltop, to Field Day with a minimum of fuss and expense.

A little foresight in the design stage optimizes field station performance. The case should have hinged panels a-plenty, especially in back, for cooling and easy access. In some field stations, tuners bolt to a front panel that swings up to rest on top of the box during operation. (They ride upside down inside when the panel is closed.)

Leaving space for a key, antenna wire and other necessities inside the box allows you to grab it and go, without juggling extra baggage. Finally, because portable things are easily stolen, you may wish to have a locking case and a means to chain the whole thing to something solid.



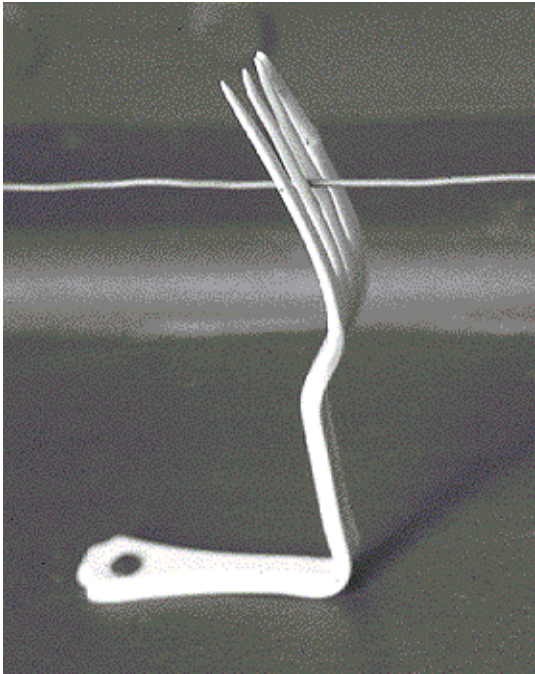
An empty wire spool serves as a spacer and a standoff.

Play it Safe

Although LPCA wattage loafs along in the light bulb neighborhood, passersby still need to be protected from live antennas, feed lines and counterpoises. The debate over RF exposure is germane as well. When people are in the vicinity of my outdoor antenna, I cut output to 50 or 25 W and enjoy the added challenge. However, even at 5 W QRP on 28 MHz, if people can be closer than a foot or two to my antenna, I need to take additional precautions. For a complete discussion of RF-related safety and compliance concerns, see the ARRL book, *RF Exposure and You* and the RF-exposure information on the ARRL Web page at <http://www.arrl.org/news/rfsafety>.

Putting the Ham Back in Radio

Some call my kind of radio "compromise operations." I respectfully disagree. A two-hour ragchew with a friend, next-state contacts via a coil hanging on the clothesline, the Polish ham who bounced off the ionosphere one afternoon and landed on my head.... With apologies to Julie Andrews, these are a few of my favorite things. The timeless thrill of wireless communication hums through my improvised hardware. And the spirit of those whiz-kids of yore, founding fathers of our service, nudges my signal just a little farther than science can explain.



Bent-fork standoffs look silly, but work great.

Simple Measures Reduce RFI

Interfering with your neighbors' appliances is a major obstacle to close-quarters operations. Preventing it can be a real pain, and high-tech solutions don't always work. In the spirit of LPCA, here are some low-tech fixes that work for me:

To ensure clean signals, I set up mirrors so I can monitor my TV while making adjustments to my station.

Reducing output power allays some RFI problems.

Sometimes I suspect that low-pass filters are more lucky rabbit's foot than hard science. They don't hurt anything, though. Mine's always in-line.

Early morning, late night, and weekday operations, when the neighborhood is least active, sidestep the lion's share of RFI problems. I listen for neighbors' TVs, especially if I know one is poorly shielded, before tuning up.

If you're still having problems, pick up a copy of the *ARRL RFI Book*. See the ARRL Publications Bookcase in the issue.